UNIVERSITI PUTRA MALAYSIA

A STUDY ON THE LEAD AND LAG RELATIONSHIP BETWEEN THE KUALA LUMPUR STOCK EXCHANGE COMPOSITE INDEX FUTURES CONTRACT AND ITS UNDERLYING KUALA LUMPUR STOCK EXCHANGE COMPOSITE INDEX

MAHDHIR ABDULLAH

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By

MAHDHIR ABDULLAH

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science.

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July 2001

Chairman: **Professor Annuar Mohd Nasir, Ph.D.**

Faculty: **Graduate School Of Management**

The birth of the Kuala Lumpur Stock Exchange Composite Index futures contract (FKLI) in December 1995 creates a lot of opportunities for research in the area of financial derivatives. This paper looks into the lead and lag relationship between the FKLI returns and the Kuala Lumpur Stock Exchange Composite Index (KLSE CI) returns since the inception of the stock index futures trading in December 1995 until December 2000. The five-year period is segmented into three subperiods to see the lead-lag behaviour under different market volatility levels. The three subperiods are: Subperiod 1) from inception to June 1997, Subperiod 2) from July 1997 to September 1998, and Subperiod 3) from October 1998 to December 2000. The first subperiod reflects the period of stable prices and thin futures trading volume, the second subperiod represents the period of highly volatile market and huge futures trading volume, and the third subperiod reflects the period of reasonably stable prices and fairly high trading volume. In this study, a multiple regression model is used as the methodology to test for the lead and lag

relationship between the stock index futures returns and KLSE CI returns. The study finds that there is a strong contemporaneous relationship and there exists a lead effect from the futures market to the spot market by one day in subperiods 1 and 3. Subperiod 2 shows a mix lead-lag relationship between the two markets. For the whole period under review, the relationship has been found to be ambiguous and inconclusive.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains.

KAJIAN HUBUNGAN SELA WAKTU DI ANTARA KONTRAK HADAPAN INDEKS KOMPOSITE BURSA SAHAM KUALA LUMPUR DAN INDEKS KOMPOSIT BURSA SAHAM KUALA LUMPUR

Oleh

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Pengerusi: **Profesor Annuar Mohd. Nasir, Ph.D.**

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Perlancaran kontrak hadapan Indeks Komposit Bursa Saham Kuala Lumpur (FKLI) pada Disember 1995 membuka banyak peluang untuk kajian di dalam bidang derivatif kewangan. Kajian tesis ini dijalankan untuk mengenal pasti kewujudan hubungan sela waktu di antara FKLI dan Indeks Komposit Bursa Saham Kuala Lumpur (KLSE CI) dari Disember 1995 hingga Disember 2000. Tempoh lima tahun ini dibahagikan kepada tiga jangkamasa untuk mengenal pasti hubungan sela waktu di dalam keadaan turun-naik pasaran yang berbeza. Ketiga-tiga jangkamasa itu adalah: Jangkamasa Pertama) sejak perlancaran FKLI pada 15 Disember 1995 hingga 30 Jun 1997, Jangkamasa Kedua) dari 1 Julai 1997 hingga 30 September 1998, dan Jangkamasa Ketiga) dari 1 Oktober 1998 hingga 31 Disember 2000. Jangkamasa pertama mewakili tempoh di mana pasaran saham dan pasaran hadapan adalah stabil dan jumlah dagangan rendah, sementara jangkamasa kedua merupakan waktu di mana keadaan turun-naik pasaran yang mendadak dan jangkamasa di mana jumlah dagangan adalah tinggi. Akhir sekali, jangkamasa

ketiga merupakan tempoh pasaran yang agak stabil dan jumlah dagangan yang agak tinggi. Di dalam kajian ini, model regresi digunakan untuk menguji hubungan sela waktu di antara kontrak hadapan Indeks Komposit dan KLSE CI. Kajian ini mendapati bahawa wujud hubungan serentak di antara kedua-dua pasaran dan wujud sela masa di mana pasaran hadapan didapati mendahului pasaran tunai selama satu hari di dalam jangkamasa pertama dan ketiga. Di dalam jangkamasa kedua, hubungan sela waktu di antara kedua-dua pasaran didapati bercampur-campur. Untuk tempoh keseluruhan, hubungan di antara jedua-dua pasaran didapati bercampur-campur.

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I certify that an Examination Committee met on 19th July 2001 to conduct the final examination of Mahdhir Abdullah on his Master of Science thesis entitled "A Study On The Lead And Lag Relationship Between The Kuala Lumpur Stock Exchange Composite Index Futures Contract And Its Underlying Kuala Lumpur Stock Exchange Composite Index" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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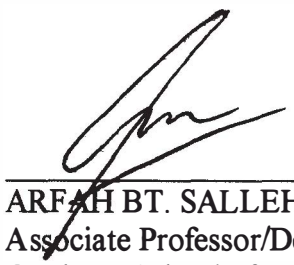

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

Mahdhir Abdullah

Date: 31 July 2001

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/NOTATIONS/GLOSSARY OF TERMS

ADF	Augmented Dickey-Fuller
CME	Chicago Mercantile Exchange
COMMEX	Commodity and Monetary Exchange of Malaysia
CPO	Crude Palm Oil
DJIA	Dow Jones Industrial Average
ECM	Error Correction Method
EPF	Employees Provident Fund
FKLI	Kuala Lumpur Stock Exchange Composite Index Futures Contract
FT-SE 100	Financial Times – Stock Exchange 100
KCBT	Kansas City Board of Trade
KLCE	Kuala Lumpur Commodity Exchange
KLIBOR	Kuala Lumpur Interbank Offer Rate
KLOFFE	Kuala Lumpur Options and Financial Futures Exchange
KLSE	Kuala Lumpur Stock Exchange
KLSE CI	Kuala Lumpur Stock Exchange Composite Index
MDCH	Malaysian Derivative Clearing House
MDEX	Malaysia Derivatives Exchange Bhd.
MFCC	Malaysian Futures Clearing Corporation
MME	Malaysian Monetary Exchange
NYFE	New York Futures Exchange
PNB	Permodalan Nasional Berhad
RIIAM	Research Institute of Investment Analysts Malaysia
SC	Securities Commission

CHAPTER I

INTRODUCTION

1.1 Introduction

Stock index futures contract is the type of new financial innovation that has gained popularity and has emerged as one of the most important financial derivatives contracts in all major futures markets of the world. Introduced as early as 1982, among the pioneer contracts are the stock index futures contracts on Value Line Stock Index, S&P 500 Stock Index, and NYSE Composite Index that are traded on Kansas City Board of Trade (KCBT), Chicago Mercantile Exchange (CME), and New York Futures Exchange (NYFE), respectively. In Malaysia, stock index futures contract on the Kuala Lumpur Stock Exchange Composite Index is the first financial derivatives product introduced in the country. This stock index futures contract was launched on December 15, 1995 and is traded on the Malaysia Derivatives Exchange Bhd (MDEX, formerly known as the Kuala Lumpur Options and Financial Futures Exchange (KLOFFE)). With the introduction of the stock index futures contract, Malaysia has become the third country in the Asian region to offer equity derivatives product after Japan and Hong Kong.

Financial derivatives have been used for hedging, speculating and arbitraging activities by sophisticated investors especially in developed countries. The stock index futures contract provides a risk management tool to equity

investors to hedge the risk of adverse movement in the stock prices. Investors who have position in the stock market may short sell the stock index futures contract in anticipation of a price decline in the stock market. As a result, any losses due to the decline in the stock market will be offset by the profit made in the futures market. Stock index futures have also been used as a tool by investors to make profits based on the price movements in both the stock and the futures markets. Because of its function as a hedging tool, price movements in the futures market must have a strong pattern in relation to the movement in the stock prices. Otherwise, the use of futures contract to hedge any possible price decline will be ineffective. In addition, stock index futures is also used by arbitrageurs to make profit from price discrepancies between the market value and the fair value of the futures contract. Consequently, arbitrage activities will bring the market value to be equal to the contract's fair value, thus will correct the mispricing of the stock index futures.

With recent introduction of such new financial instrument, many issues need to be explored. The word 'derivatives' gets its name because the value of the derivative instrument is derived from the value of the underlying asset. In the case of the Kuala Lumpur Stock Exchange Composite Index futures contract (FKLI), the underlying instrument is the basket of one hundred stocks in the Kuala Lumpur Stock Exchange Composite Index (KLSE CI). Therefore, theoretically, the price of FKLI and KLSE CI should move in tandem with each other. The empirical issue is whether this co-movement is observed in practice, especially in less institutionally developed country like Malaysia. The relationship between the futures market and the underlying spot market is of interest to many researchers. In this study, the

issue that needs to be addressed is the relationship between the price movements in the futures and the stock markets. Specifically, this study ascertains the lead and lag relationship between FKLI and its underlying instrument, the KLSE CI.

In recent years, Malaysia has increased its effort to liberalise the financial sector and to make Kuala Lumpur as the regional financial centre. As a result, a number of new financial innovations have been introduced in the Malaysian capital market namely the stock index futures, the offshore financial centre, securities borrowing and lending, and the stock index options. Furthermore, Malaysian capital market is expecting a few more financial products such as the options on individual stocks and the Syariah Index futures. Rapid development of the Malaysian capital market opens windows of opportunity for research particularly in the area of financial derivatives.

1.2 Background of the Study

The introduction of the Kuala Lumpur Stock Exchange Composite Index Futures contract (FKLI) creates a new arena in equity trading in Malaysia. Investors now have the avenue to hedge their stock market positions and have the alternatives to formulate their portfolio strategies using stock index futures. Although the main function of stock index futures is for hedging, this financial derivatives instrument is also used for speculation and arbitraging. Speculators trade stock index futures to take advantage of the price movements in the market

based on their preconceived expectations about the direction of the market. Stock index futures provides a cheap yet highly-leveraged way to speculate. It is cheap because the brokerage fees are relatively low compared to the commissions on individual stocks and the traders do not have to pay the contract value in full. In terms of the brokerage fees, traders are charged RM60 per contract or RM120 per round trip. This is equivalent to about 0.1 percent to 0.2 percent of the contract value, relatively cheaper as compared to the commissions on individual stock of 0.75 percent per transaction or 1.5 percent per round trip. Secondly, traders are required to pay only a small amount of upfront capital known as initial margin to start trading stock index futures. As effective from 2nd January 2001, the initial margin requirement is RM4,000 per contract. If a trader short sells one FKLI contract on 1st March 2001 at 695.2 and buys back the contract on 20th March 2001 at 664.4, the trader makes a gross profit of RM3,080 [(695.2-664.4) x RM100 = RM3,080]. His net profit would be RM2,960 [RM3,080-RM120 = RM2,960]. From this exercise, he enjoys a net return of 74 percent [RM2,960 / RM4,000 = 0.74]. The above example shows that the stock index futures is a highly leveraged financial instrument where small price changes in the stock index futures can generate huge profits. Lastly, stock index futures contract is used by arbitrageurs to make profits based on price discrepancies between the market value and the fair value of the futures contract.

According to the theory, the futures price should move simultaneously with the stock index, otherwise arbitrage opportunities will exist. This contemporaneous relationship is true in perfectly efficient markets where information and market

sentiments being discounted immediately into the futures and the stock prices. The issue is whether such contemporaneous co-movement of prices in both markets is observed in reality. When an information comes into the market, it is processed and discounted into the stock prices and the futures prices. If the information is processed at different speed in different markets, then the price changes in one market may be faster than in the other market. In a more technical term, price discovery takes place in the market that processes the information faster, and this market is said to lead the other market. Previous studies done by others have shown that futures market tends to lead the spot market in most cases. Herbst, McCormack and West (1987) performed a study on Value Line Index futures and S&P 500 futures with respect to their underlying stock indices, and found that the stock index futures prices tend to lead those of their cash indices. Kawaller, Koch and Koch (1987) found that the futures prices lead the cash prices for between twenty and forty-five minutes. There are studies that observed feedback effects from the spot market to the futures market. Stoll and Whaley (1990) concluded that the futures market leads the cash index by five minutes, sometimes up to ten minutes but this relationship is not unidirectional.

Martikainen, Perttunen and Puttonen (1995) suggested that the price leadership from the futures market to the spot market are due to three reasons namely the infrequent trading of the component stocks within the index, the low transaction costs to trade futures contract, and less restrictive short-selling in the futures market. This study also addresses the three reasons above as the possible

causes that influence the lead and lag relationship between FKLI futures and the KLSE CI. The elaboration of the above reasons is discussed below:

1) The infrequent trading of the component stocks within the KLSE CI

The KLSE CI consists of one hundred stocks listed on the Kuala Lumpur Stock Exchange (KLSE). The index is calculated based on the capitalisation-weighted method which means the stock price is multiplied by the number of outstanding shares and then averaged to get the index value. It must be noted that not all the one hundred component stocks of KLSE CI are traded simultaneously at any point of time. Some stocks may reflect to the new information immediately, some may take longer time, and some may not reflect at all. Furthermore, with the capitalisation-weighted method, the price movement of largely capitalised stocks tends to greatly influence the changes in the index price. Similarly, small-capitalised stocks do no have great impacts on the price movement of the stock index. The stock index futures, on the other hand, reacts to new information immediately since buying and selling futures contract are done in a package. Meaning to say, when buying the FKLI contract, the buyer is purchasing a contract that consists of one hundred component stocks of KLSE CI. Due to infrequent trading of the KLSE CI component stocks, it is anticipated that the stock index will reflect to new information slower than the index futures. Hence, the index futures price tends to lead the spot stock index.

2) Lower transaction costs and capital requirement to trade in the futures market

In the futures market, the brokerage fee and commission is RM60 per contract, or RM120 per round-trip. This is equivalent to about 0.1 percent to 0.2 percent of the contract value per round-trip. The transaction cost is relatively lower than the transaction costs to buy or sell stocks in the stock market which average around 0.75 percent of the transaction value. Because of lower transaction costs in the futures market, it is easier for investors to trade the futures contract. Hence, investors will react to new sentiments by trading in the futures market, as a result the futures price will reflect to new information faster than the spot price. Therefore, futures price is believed to lead the spot price due to lower transaction costs in the futures market. In addition, investors do not have to pay the full amount of the contract value to trade futures. They only have to pay an initial margin of RM4,000 (as effective from 2nd January 2001) and have to top up any daily losses through the mark-to-market process. This small capital requirement also promotes inexpensive trading in the futures market. Both low transaction costs and small capital requirement make trading in the futures market cheaper than trading in the spot market, cause the futures market to process new information faster, and thus induce the futures price to move earlier than the spot price.

3) No short selling restrictions in the futures market

Unlike the stock market, the futures market allows short-selling activities. That means, investors can sell the futures contract although they do not hold it. Without any restrictions on short selling, futures market should be more liquid than the spot

market especially during the bearish period. Due to higher liquidity, the futures market processes information faster than the spot market, then the initial price movement should take place in the futures market.

The three factors discussed above are among the most prominent factors that explain why futures market is expected to lead the spot market. In Malaysia, stock index futures is still at an infancy stage with the birth of the Kuala Lumpur Stock Exchange Composite Index futures contract (FKLI) came about in December 1995. With the recentness of the stock index futures in an emerging market context, this is an interesting research issue to be addressed. The next section discusses the background and the characteristics of the Kuala Lumpur Stock Exchange Composite Index (KLSE CI), the underlying asset of FKLI.

1.3 Kuala Lumpur Stock Exchange Composite Index

The Kuala Lumpur Stock Exchange Composite Index (KLSE CI) is a capitalisation-weighted index comprising of one hundred stocks listed on the Kuala Lumpur Stock Exchange (KLSE). Since it was introduced in 1986, this index has been widely used as a representation of the stock market performance in Malaysia and is also referred as the benchmark index. This basket of stocks is reviewed consistently and the selection of the KLSE CI's constituent stocks is performed occasionally according to the criteria set forth by the exchange. This is to ensure the index reflects the general economic performance of the country. As at 6th

November 2000, 81 percent of KLSE CI's component stocks are represented by five sectors namely the trading and services sector (28 percent), the industrial products (16 percent), the finance sector (13 percent), the property and development sector (12 percent), and the consumer products (12 percent). The remaining 19 percent of the index is comprised of stocks from six other sectors. The list of KLSE CI's constituent stocks is attached in Appendix A. The composition of the KLSE CI may change over time upon review by KLSE based on the exchange's selection criteria.

1.4 Kuala Lumpur Stock Exchange Composite Index Futures Contract

The Kuala Lumpur Stock Exchange Composite Index futures contract (FKLI) is the first financial derivatives product introduced in Malaysia. This equity futures contract is a binding agreement between the buyer and the seller to deliver and to take delivery of the basket of KLSE CI component shares, at a stipulated price, at a designated date in the future. The underlying instrument of the FKLI is the 100 component stocks of the Kuala Lumpur Stock Exchange Composite Index (KLSE CI). Since KLSE CI comprises of one hundred stocks, accepting and taking delivery is a difficult and costly process. Thus, instead of the delivery of the basket of stocks that make up the index, the stock index futures contract is cash settled. Under this settlement process, there is no physical delivery of the underlying asset. Instead, on the last day of trading, the difference between the value of the futures contract and the last settlement price is determined. If the holder of the contract

makes a profit, he will receive cash, and if he incurs losses, he will have to pay cash equivalent to the amount of the losses. For example, an investor buys one FKLI contract on 1st March 2001 at 695.2 points and closes out his position on 20th March 2001 at 664.4 points. When he purchases the futures contract, he needs to pay an initial margin of RM4,000 as a good faith money. The decline in the FKLI price by 30.80 points causes him to lose RM3,080 [30.8 x RM100] or RM3,200 net [-RM3,080-RM120]. Through the cash settlement process, he needs to pay RM3,080 to cover his losses and to bring the account balance back to the initial margin level. While holding the contract for twenty days, any daily gains are credited to the investor's margin account and any losses have to be topped up by putting cash into his margin account. This daily settlement process is known as mark-to-market.

FKLI is traded on the Malaysia Derivatives Exchange Bhd. (MDEX), (formerly known as KLOFFE), a wholly-owned subsidiary of KLSE. This stock index futures contract has four contract months namely the spot month, the next month, and the next two calendar quarterly months. The calendar quarterly months are March, June, September, and December. Each contract expires on the last trading day of the contract month and any open position is cash settled by 9.30 a.m. on the day following the contract's final trading day. This means that investors may not hold the futures contracts indefinitely because the expiry dates are specified. The contract specifications of the FKLI futures contract is appended in Appendix B for references.